4.0 REMAINING SALMONID SURVIVAL ISSUES TO BE MITIGATED

Since construction of Wells dam, the DCPUD has invested millions of dollars investigating strategies and methods to reduce potential impacts of the project on anadromous salmonids. Conditions of the original FERC license and subsequent Settlement Agreements with the Joint Fisheries Parties have outlined a number of measures implemented by the DCPUD to improve migration survival and production of mid-Columbia River salmonids. The previous section described the variety of potential issues associated with operation of the project and identified potential outstanding impacts. Section 4.0 provides a brief summary of the issues and concerns addressed in the previous section and identifies those issues that may cause potential "take" of a species.

4.1 UPSTREAM PASSAGE OF ADULT FISH

4.1.1 Upstream Passage at Wells Dam

Adult upstream passage facilities are operated in accordance with criteria specified in the 1990 Settlement Agreement (Federal Energy Regulatory Commission 1990). Fishway modifications to address impacts, if any, to adult passage are implemented in agreement with the Wells Project Coordinating Committee (WCC). In 1993, two radio-telemetry studies were conducted, one of adult chinook and one of sockeye, to assess passage conditions throughout the mid-Columbia River reach (Stuehrenberg et al. 1995) and above Rocky Reach dam (Swan et al. 1994), respectively. Based on the results of the radio-telemetry studies, reducing the number of fishway entrances (which may be effective at other mid-Columbia projects) may not significantly improve adult upstream passage time for chinook or sockeye salmon at Wells dam. The side entrances were inefficient at passing spring and summer chinook and sockeye, but were efficient for passing fall chinook (Stuehrenberg et al. 1995). The left downstream entrance was consistently effective for passing all three chinook races/demes and sockeye, and the right downstream entrance was consistently effective for passing spring and fall chinook. However, the median time required by spring and summer chinook to negotiate the collection channel system and enter the ladder was longer than for other mid-Columbia projects (Stuehrenberg et al. 1995). No data were available for sockeye (Swan et al. 1994). These data may indicate that some fishway modification could be made to decrease adult passage time for these stocks. Current fishway modifications to meet operating criteria have been addressed under existing agreements. Additional monitoring and modifications that go beyond existing operating criteria and agreements will be addressed in Sections 5 and 6 of this document.

4.1.2 Upstream Reservoir Passage

Upstream passage of adult fish through Wells reservoir is not expected to cause significant delay or mortality and is not considered an outstanding HCP technical issue. Travel rates through Wells reservoir for upstream migrating salmon are similar to the ranges of salmon travel rates documented in the lower Columbia and Snake Rivers (see Section 3.1.2).

4.2 DOWNSTREAM PASSAGE OF JUVENILE FISH

4.2.1 Downstream Passage at Wells Dam

Numerous actions have been implemented at the Wells Project to minimize and mitigate the impact of dam passage on the downstream migration of juvenile fish. These actions include spill, improvements in turbine structures and operation, juvenile bypass system development and installation and fish production mitigation. The following paragraphs summarize the measures implemented by the DCPUD to improve juvenile passage survival past Wells dam. Due to the success of these measures and the existing 1990 Settlement Agreement between the DCPUD and the fishery agencies and tribes, downstream juvenile passage survival at Wells dam is not considered an outstanding HCP technical issue.

Spill for juvenile fish passage was implemented beginning in 1979 and continued through 1986. In 1987, spill for juvenile passage was terminated, by agreement of the Mid-Columbia Coordinating Committee, due to installation of the Wells juvenile bypass system.

Beginning in 1984, the DCPUD implemented a program to design, test and construct 10 new high efficiency Kaplan turbine runners with adjustable blades. The new runners were installed between 1988 and 1990. The new runners increased the maximum operating efficiency of each unit and had smaller clearances between the adjustable blade and adjacent surfaces. These features may result in reduced juvenile turbine passage mortality at Wells dam, based on the current understanding of the causal factors in turbine mortality.

The Wells juvenile bypass system began full-scale operation in 1989, following nine years of research and development. Performance criteria for the bypass system set forth in the 1990 Wells Settlement Agreement call for meeting fish passage efficiency (FPE) of at least 80 percent for the juvenile salmonid spring migration period and an FPE of at least 70 percent for the juvenile salmonid summer migration period. The juvenile bypass system was evaluated from 1990 through 1992 during the spring and summer juvenile migration periods per the 1990 Settlement Agreement. Each year, results far exceeded the 80/70 FPE performance criteria, with an arithmetic average spring and summer migration period FPE of 89.4 and 89.0 percent, respectively.

The hatchery-based compensation program developed as mitigation for losses of juvenile migrants is being conducted from the Wells fish hatchery, Methow hatchery and associated facilities and the experimental Cassimer Bar hatchery as specified in the 1990 Settlement Agreement. The DCPUD is funding the Joint Fishery Parties to develop and conduct studies to evaluate the effectiveness of the hatchery-based compensation program and the associated production plan. The studies will meet standards developed for similar efforts under the NPPC's Fish and Wildlife Program.

4.2.2 Downstream Reservoir Passage

Under existing conditions, water particle travel time (WPTT) in the mid-Columbia River is roughly twice as fast as the WPTT in the lower Columbia River (see Section 3.2.2). Additionally, Wells reservoir has a fast turnover rate. These factors combine to move water rapidly through Wells reservoir, in comparison to lower Columbia mainstem and other mid-Columbia River mainstem reservoirs. Thus, reservoir mortality is expected to be low in the Wells Reservoir due to the relatively fast WPTT. However, a project survival study will assess the mortality associated with the Wells Reservoir.

4.3 WATER QUALITY

4.3.1 Dissolved Gas Supersaturation

Daily average total dissolved gas (TDG) levels measured in the Wells dam forebay during the juvenile and adult migration season, April through September, generally exceed 100 percent (see Section 3.3.1). These levels are primarily dictated by flow releases from upstream projects, and are dominated by releases from Grand Coulee dam and spill at Chief Joseph dam. In spite of the occasional high levels of TDG observed in the Wells dam forebay caused by spill at Grand Coulee and Chief Joseph dams, monitoring of external symptoms in salmonid outmigrants has shown a low incidence of GBT. The DCPUD currently monitors TDG levels and water temperatures at the project and cooperates with federal operators in a system-wide TDG supersaturation abatement program. Additional monitoring and potential operational and structural modifications to reduce TDG levels at Wells dam are discussed in Sections 5 and 6 of this document.

4.3.2 Water Temperature

The thermal regime of the mid-Columbia River is determined by the temperature of water released from Grand Coulee dam. Wells reservoir's very short hydraulic retention time does not allow thermal stratification or significant solar heating and concomitant water temperature increases. No mitigation has been directed at modifying water temperature, but monitoring is conducted by the DCPUD in conjunction with TDG monitoring.

4.4 RESERVOIR PRODUCTION

Little is known regarding the effects of environmental conditions on adult spawning and juvenile rearing of species of concern in Wells reservoir. Fall chinook salmon spawn in the Wells tailrace and in the upper portion of the Wells Reservoir downstream of the Chief Joseph tailrace and nearly all races/demes spawn in either the Methow and/or Okanogan River systems, but no other species of concern are known to spawn in the project area (see Section 3.4.1) (Giorgi 1992; Mullan et al. 1986). Because chinook have been observed spawning in deep water, minor reservoir fluctuations are not expected to impact mainstem spawning habitat. Juvenile spring chinook and sockeye salmon use Wells reservoir as a migration corridor and therefore do not remain in the reservoir for rearing (Chapman et al. 1995a, 1995b). Juvenile summer/fall chinook are known to remain in the reservoir until at least July, and therefore are affected by conditions in the reservoir (Chapman et al. 1994a). Existing mitigation for impacts to mainstem habitat due to creation of Wells reservoir has been stipulated in the 1990 Settlement Agreement for the Wells Project.

4.5 PREDATION

Gulls and northern squawfish congregate to prey on juvenile outmigrants as they pass the dam, which may result in significant outmigrant mortality (Ruggerone 1986; Loch et al. 1994; Burley and Poe 1994). The population of walleye and smallmouth bass in Wells reservoir is low, presumably due to low water temperatures and lack of backwater rearing areas, which reduces the risk of predation by these species.

The mitigation measures currently employed in the project area by the DCPUD are installation of gull wires and hazing, designed to prevent gulls from preying on juvenile salmonids in the tailrace, and implementation of a predator control program in the tailrace and at the Wells fish hatchery release site. No monitoring program exists for evaluating juvenile losses to predation. Improving outmigrant production and survival through predator control methods will be one goal of the HCP. Details of additional control methods and monitoring plans will be described in Sections 5 and 6 of this document.

4.6 COHO REINTRODUCTION

In 1997, the Yakama Indian Nation (YIN) initiated a supplementation program for selected tributaries of the mid-Columbia Region with early stock coho salmon from lower Columbia River hatcheries to restore natural production identified in the Yakama Nations's "Coho Salmon Species Plan (CSSP) for the mid-Columbia Region". The goal of this program is to initiate restoration of coho salmon populations in mid-Columbia tributaries to levels of abundance and productivity sufficient to support sustainable annual harvest by tribal and other fishers.

In 1996, YIN staff identified selected habitats and acclimation pond sites in the Methow watershed for the

potential reprogramming of adult and/or juvenile coho salmon from appropriate lower river hatcheries. It is expected that when adults are transferred they will spawn naturally in areas close to where they are released with rearing in suitable production areas identified in the CSSP. Similarly, juvenile releases would rear up to one year in suitable production areas, returning after ocean migration to these same areas to spawn. Pre-smolts would be acclimated for one month in low-cost ponds prior to their release. A full description of this program is in CSSP.

In 1996, YIN implemented a small feasibility study by releasing 350,000 early run coho salmon juveniles into the Methow Watershed. Of these, 100,000 smolts were acclimated two weeks in the Fulton Irrigation canal and volitionally released into Chewuch River. The remaining 250,000 smolts were acclimated one month at Winthrop NFH and released directly into the Methow River.

The reintroduction of coho salmon to the mid-Columbia Region is an issue to be resolved outside the scope of the HCP. However, coho salmon will be included as a Plan Species in the HCP. As coho salmon reintroduction efforts proceed, the same mitigative measures afforded to other Plan Species shall be provided to coho salmon that are produced from the mid-Columbia Region. Off-site compensation activities for coho salmon to achieve NNI shall be based on losses to naturally produced coho salmon, losses to second-generation hatchery produced coho salmon from adults returning to the mid-Columbia Region, and losses to adults to the mid-Columbia Region from both reintroduction efforts and coho salmon produced in the mid-Columbia Region.

Compensation for coho will be based on a five-year rolling average of natural production or some sustained run returning to the hatchery. The adult to smolt return ratio shall exceed 0.003 percent to receive compensation under this plan. Adult survivals less than this level would be regarded as an unsuccessful reintroduction program.